PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2002-260581**

(43)Date of publication of application : **13.09.2002**

(51)Int.Cl. H01J 61/20
H01J 61/35
H01J 61/36
// F21S 8/10
H05B 41/24
H05B 41/282
F21Y101:00

(21)Application number : **2001-055850**

(22)Date of filing : **28.02.2001**

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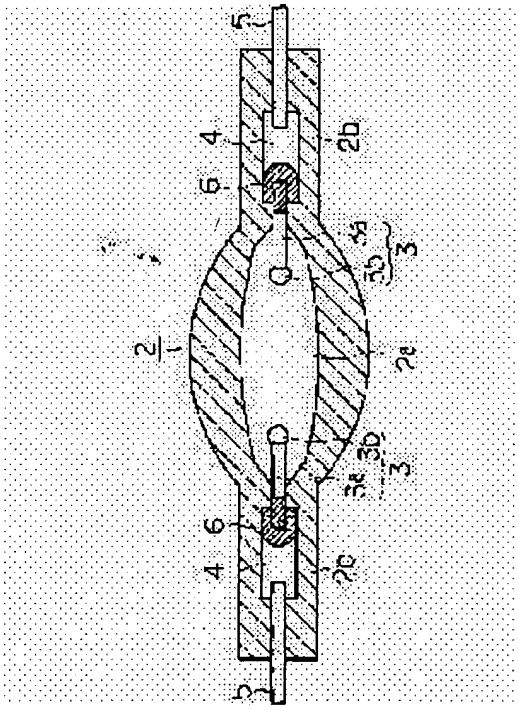
(54) METAL HALIDE LAMP, METAL HALIDE LAMP LIGHTING DEVICE, AND AUTOMOBILE HEADLIGHT

(57)Abstract:

PROBLEM TO BE SOLVED: To improve shortening of the life, which is caused by not using mercury, in a metal halide lamp in which no mercury which adversely affects environment is essentially used.

SOLUTION: A metal halide lamp 1 is provided with a discharge vessel 2 comprising a discharge space 2a and a sealing part 2b. The discharge vessel 2 contains a metal halide and rare gas, with a discharge medium containing essentially no mercury sealed in. A pair of electrodes 3 are opposed to each other in the discharge space 2a, with each base-side end part of the electrodes 3 jointed to a sealing metal foil (Mo foil) 4. Each of the other end part side of the sealing metal foil 4 is jointed to an external lead 5, and under this condition, the sealing metal foil 4 is sealed to a sealing part 2a in air-tight manner. A region including the joint part



between the sealing metal foil 4 and the electrode 3 is coated with a coating film 6 comprising at least one kind which is selected from among metal, metal oxide, and metal nitride, resulting in suppressed reaction with the discharge medium.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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[Detailed Description of the Invention]
[0001]
[Field of the Invention] the metal halide lamp lighting device for which this invention used a metal halide lamp and it, and the object for automobiles -- a headlight -- it is related with equipment.
[0002]
[Description of the Prior Art] A metal halide lamp raises the luminous efficiency and the color rendering properties of a lamp by enclosing various kinds of halogenation metals (metal halide) within luminescence with mercury and rare gas. Thus, since a metal halide lamp has the descriptions, such as efficient and high color rendering properties, it is broadly used as objects for general lighting, such as store lighting and street lighting. furthermore, the headlight of an automobile -- also in equipment, a metal halide lamp is increasingly used as the light source.
[0003] As mentioned above, in the conventional metal halide lamp, the thing using mercury as some discharge media is common. However, by current [which the environmental problem has been aggravating], decreasing use of mercury with a large environmental load also in the lighting field is called for, and abolishing mercury from a lamp at large further is considered as a very important problem.
[0004] Some cures for not using mercury in a metal halide lamp are proposed to such a problem. For example, the metal halide lamp which enclosed a halogenide and rare gas, such as a scandium (Sc), sodium (Na), and rare earth elements, as a discharge medium is indicated by the patent No. 2982198 official report and JP,6-84496,A.
[0005] The metal halide lamp which enclosed with JP,11-238488,A the 2nd halogenide to which vapor pressure is high and cannot emit light easily in addition to the 1st halogenide which is the main photogene is indicated. Furthermore, in addition to the halogenide of Sc and Na, the metal halide lamp which enclosed the yttrium (Y), the halogenide of an indium (In), etc. as the 3rd additive is indicated by JP,11-307048,A. Each of these copes with the various problems based on not using mercury (Hg).
[0006]
[Problem(s) to be Solved by the Invention] By the way, in the metal halide lamp (Hg loess metal halide lamp) which does not use Hg mentioned above, the problem as newly shown below has arisen based on not using Hg as some discharge media.
[0007] With Hg loess metal halide lamp, the problem that the reaction of the sealing metallic foil and discharge medium which consist of an Mo foil which secures the airtightness of a discharge container tends to occur is in the 1st first. That is, the discharge container which consists of quartz glass etc. has discharge space, and in this discharge space, the electrode of a pair counters and it is arranged. These electrodes have for example, the electrode shaft and the electrode point prepared at the tip. The electrode shaft is joined to sealing metallic foils, such as Mo foil, and the electrode of a pair is connected with the external lead drawn by the exterior of a discharge container through this sealing metallic foil, respectively.
[0008] The airtightness of a discharge container seals an electrode shaft and a part of external lead with sealing metallic foils, such as Mo foil, in the closure section prepared in the both ends, and is maintaining them by sticking the closure section and near the center of Mo foil. Since the electrode shaft is joined, the discharge space side edge section of Mo foil has not been completely stuck to the closure section of a discharge container. For this reason, irrespective of Hg enclosure metal halide lamp and Hg loess metal halide lamp, the discharge space side edge section of Mo foil reacts with a discharge medium, and has a possibility that this may cause problems, such as a foil piece of Mo foil, and a crack of the closure section.
[0009] In Hg loess metal halide lamp, the problem based on the reaction of the above-mentioned Mo foil and the above-mentioned discharge medium arises notably. In order that this may form HgI2 etc. in Hg enclosure metal halide lamp, in Hg loess metal halide lamp, it is easy to generate a metal, the isolation iodine which is easy to react to what halogen gas, such as isolation iodine, cannot generate easily, and especially Mo foil is for being easy to react with isolation iodine from W electrode.
[0010] Furthermore, in Hg loess metal halide lamp, in order to secure lamp voltage instead of mercury, the metal halide which added the halogenide with high vapor pressure may be enclosed. With such a lamp, when the metal halide vapor pressure under lighting increases, the reaction rate of Mo foil and a discharge medium (especially halogen gas, such as isolation iodine) will increase. Moreover, addition

metal halide which was described above has much matter with reactivity high in itself, and the reaction of metal halide and Mo foil also poses a problem.
[0011] As mentioned above, in Hg loess metal halide lamp, the reaction of Mo foil, and the halogen gas in a discharge medium and a halogenation metal poses a big problem. If the reaction of Mo foil and a discharge medium occurs, a crack arises in a foil piece or the closure section, leak occurs, or there is a possibility that a burst may occur further, and it has become the big factor as which these determine the life of a metal halide lamp. Since it is such, the reaction of Mo foil, and the halogen gas in a discharge medium and a halogenation metal is controlled, and this is strongly wanted to raise the life of Hg loess metal halide lamp.
[0012] In Hg loess metal halide lamp, there is a problem of being easy to produce a back arc immediately after starting in the 2nd. In addition, between electrode points, discharge does not take place but the back arcs said here are an electrode shaft and abnormality discharge which discharges considering the root Motobe as an origin further.
[0013] That is, in Hg enclosure metal halide lamp, mercury adheres to an electrode point after putting out lights. Electrical conductivity of mercury is large, and since it is easy to carry out a temperature rise, discharge produces it from immediately after starting between electrode points. On the other hand, in Hg loess metal halide lamp, an isolation halogen solidifies and adheres to an electrode point after putting out lights. In addition, when Hg is enclosed, an isolation halogen disappears in order to form halogenation mercury, even if it generates.
[0014] The electric conductivity of the condition that the isolation halogen solidified and adhered to the electrode point is worse than the condition that mercury has adhered. Furthermore, the temperature of an electrode point rises at the moment of turning on a lamp, and since the isolation halogen adhering to an electrode point and the metal halide which has adhered by the case evaporate rapidly, only as for the perimeter of an electrode point, the concentration of an isolation halogen etc. becomes high. Since electronic adsorbent one is high as for isolation halogen gas or metal halide gas, discharge in the perimeter of an electrode point is checked, an origin is moved to the electrode shaft and pan which are easier to discharge at the root Motobe, and discharge starts. This condition is a back arc. Then, if concentration, such as isolation halogen gas of the perimeter of an electrode point, falls, it will shift to discharge between electrode points.
[0015] If a back arc which was mentioned above arises, the following faults will occur. First, since a back arc discharges by root Motobe of an electrode, the distance of Mo foil and discharge becomes near and a reaction with an isolation halogen or a halogenation metal is promoted because Mo foil carries out a temperature rise. The reaction of this Mo foil, and an isolation halogen and a halogenation metal will cause leak by the foil piece and the crack, a burst, etc., as mentioned above, and it will reduce the life of Hg loess metal halide lamp by these.
[0016] Moreover, migration of the discharge origin accompanying generating of a back arc becomes causes, such as failure in starting, and CHIRATSUKI. Furthermore, the metal halide which has trespassed upon the perimeter of an electrode shaft of closure circles of a discharge container carries out a temperature up rapidly by approach of a discharge origin, and evaporates, and there is also a problem of producing Orange luminescence of bright Na etc.
[0017] Thus, in Hg loess metal halide lamp, it is easy to produce the abnormality discharge on the basis of an electrode shaft or its root Motobe, i.e., a back arc, and there is a problem that the reaction of Mo foil, and an isolation halogen and a halogenation metal is easier to be promoted by this. Furthermore, since a back arc causes the lighting failure at the time of starting, and CHIRATSUKI and abnormality luminescence, controlling generating of the back arc immediately after starting in Hg loess metal halide lamp is called for.
[0018] furthermore, Hg loess metal halide lamp -- the headlight of an automobile -- although used for the ** light source in many cases, especially in such a case, it is easy to produce the 3rd problem as shown below. the object for automobiles -- a headlight -- the metal halide lamp used for equipment has many counts of flashing remarkably as compared with a common metal halide lamp, and the injection power immediately after starting doubles [more than] further at the time of stability. On the other hand, since the closure section of a metal halide lamp has joined to the quartz glass which has sealed, namely, constitutes a discharge container where an electrode shaft is joined to Mo foil as mentioned above, based on the configuration etc., it is easy to generate bigger distorted stress than other parts.
[0019] When the distorted stress of the closure section mentioned above is large, a possibility that a crack and a burst may arise in the closure section with the thermal stress accompanying flashing

actuation etc. becomes high. and the object for automobiles -- a headlight -- with equipment, as mentioned above, there are many counts of flashing of a lamp, the injection power immediately after starting is still larger, and it is especially easy to form a metal halide lamp by the crack of the closure section, or burst to ** which big thermal stress generated and burned into a short life. Since it is such, the distorted stress and thermal stress in the closure section of a discharge container are mitigated, and it is called for that this aims at improvement in a life of Hg loess metal halide lamp.

[0020] This invention was made in order to cope with such a technical problem, and it aims at offering the metal halide lamp which has improved the fall of the life property accompanying not using mercury etc. in the metal halide lamp which does not use in essence the mercury which has a bad influence on an environment.

[0021] It aims at offering Hg loess metal halide lamp which raised the life property by specifically controlling a reaction with the sealing metallic foil set to the 1st from Mo foil etc., the isolation halogen in a discharge medium, a halogenation metal, etc. While raising a life property to the 2nd by controlling generating of the abnormality discharge (back arc) on the basis of an electrode shaft or its root Motobe, it aims at offering Hg loess metal halide lamp which suppressed CHIRATSUKI and abnormality luminescence to it. It aims at offering Hg loess metal halide lamp which aimed at improvement in a life property etc. to the 3rd by mitigating the distorted stress and thermal stress in the closure section of a discharge container.

[0022]

[Means for Solving the Problem] The metal halide lamp of invention according to claim 1 The electrode of the pair which countered in the discharge container which has the closure section prepared in the both ends of discharge space and said discharge space, and the; aforementioned discharge space, and has been arranged; It is joined to the base side edge section of the electrode of said pair, respectively. And the sealing metallic foil in which sealing was airtightly carried out by said closure section; It is joined to the other-end section side of said sealing metallic foil, respectively. And the external lead of the pair drawn out of said discharge container; It is partially formed so that the field containing a joint with said electrode of said sealing metallic foil may be covered. Coating film which is chosen from a metal, a metallic oxide, and a metal nitride and which consists of a kind at least; it is enclosed in said discharge container and characterized by providing the discharge medium which does not contain mercury in essence, and;, including a halogenation metal and rare gas.

[0023] In each invention shown in invention according to claim 1 mentioned above and the following, unless it specifies especially, a terminological definition and technical semantics are based on a degree.

[0024] (discharge container) The discharge container is constituted from refractoriness by the tight container of translucency, and has discharge space and the closure section prepared in the both ends. if the light of the request wavelength region which the tight container equipped the usual operating temperature of a discharge lamp with the refractoriness borne enough, and was generated by discharge can be derived outside -- how -- it may be made from the ingredient. For example, ceramics, such as quartz glass, translucent alumina, and YAG, or these single crystals can be used. In addition, forming halogen-proof nature or the transparency coat of metallicity-proof in the inside of a tight container, or reforming the inside of a tight container if needed, is permitted.

[0025] (electrode) The electrode of a pair counters in discharge space and is arranged. The metal halide lamp of this invention may be constituted so that the light may be switched on by any of an alternating current and a direct current. Therefore, the electrode of a pair can be made into the same structure when making it operate by alternating current. moreover, the metal halide lamp of this invention -- an automobile -- a headlight -- when using as a **, it is convenient if an electrode point is made into path size from an electrode shaft.

[0026] namely, an automobile -- with a headlight, since a bigger current than the time of a stationary is passed at the time of starting while the count of flashing of a lamp increases very much, only an electrode point can be made to be able to respond to frequent flashing by considering as path size, and an electrode shaft can control generating of the crack in the closure section by considering as a narrow diameter. Furthermore, generally, when making it operate by direct current, since the temperature rise is intense, it is desirable [an anode plate] to form path voluminousness in an electrode point similarly, and to enlarge a heat sinking plane product. It is not necessary to necessarily form path voluminousness in the electrode point of cathode.

[0027] 6mm or less is suitable for the inter-electrode distance of the electrode of a pair practical. namely, -- if inter-electrode distance exceeds 6mm -- from the point light source -- separating -- the

focal property of optical system -- bad -- becoming -- for example, an automobile -- a headlight -- when it uses as the ** light source, the brightness of an exposure side will fall. In addition, although the inter-electrode distance said here corresponds to the metal halide lamp of a short arc form, it is also possible for this invention not to necessarily be restricted to this and to constitute the metal halide lamp of a long arc form.

[0028] (sealing metallic foil) While a sealing metallic foil consists of a refractory metal foil like Mo and an electrode is joined to one edge side, it is used, joining an external lead to an other-end section side. In such the condition, sealing of the sealing metallic foil is carried out by the closure section of a discharge container, it is making it stick to quartz glass etc., and the airtightness of a discharge container is maintained. In addition, especially the junction to a sealing metallic foil and an electrode may not be limited, and may be weldbonding, or may be soldering junction.

[0029] A sealing metallic foil has the shape of a rectangle etc., and the configuration which prepared the edge section in the both ends of the longitudinal direction further, and raised sealing nature is applied. As for the thickness of such a sealing metallic foil, it is desirable to consider as the range of 10-50 micrometers practical. Furthermore, after forming the coating film, in order to secure the sealing nature to a discharge container, as for the die length of a sealing metallic foil, it is desirable to consider as the range of 3-20mm.

[0030] (coating film) The coating film consists of a kind of ingredient chosen from a metal, a metallic oxide, and a metal nitride at least. Since sealing of the coating film is carried out by the closure section with a sealing metallic foil, the ingredient which has resistance substantially to the conditions for 5 - 60 seconds at 1500 degrees C is used for the component. It is desirable to use the ingredient which does not deteriorate under the conditions which 2/3 or more [of thickness] was lost under the conditions described above here as the ingredient which has resistance substantially, and meant the ingredient which does not emit the gas which poses a problem to lamp lighting, and were especially described above.

[0031] Coating film which was mentioned above is formed so that the field containing a joint with the electrode of a sealing metallic foil may be covered, while consisting of a kind of ingredient with which a reaction with an isolation halogen or metal halide is controlled, and it is first chosen especially as the 1st out of a metal, a metallic oxide, and a metal nitride in a sealing metallic foil and a discharge medium at least. That is, the part upon which isolation halogen gas and metal halide gas in a discharge medium trespass is a joint edge with the electrode of a sealing metallic foil, and it forms the coating film so that such [at least] a part may be covered. Although the coating film may be formed only in the one side field of the sealing metallic foil containing a joint with an electrode, it is desirable to form so that both sides and the whole surface of the sealing metallic foil which includes a side face (for example, the above-mentioned edge section and the above-mentioned discharge space side edge side) further may be covered about the discharge space side edge section of a sealing metallic foil.

[0032] Moreover, as for the coating film, it is desirable to have the part which has the compactness to which a sealing metallic foil does not touch these gas directly when controlling the reaction of a sealing metallic foil, and an isolation halogen and metal halide 95% or more by surface ratio. When a low part of compactness upon which gas trespasses exceeds 5% of the area of the coating film, there is a possibility that generating of the fault by the reaction of a sealing metallic foil, and an isolation halogen or metal halide cannot fully be controlled. When forming the coating film with a metallic-oxide metallurgy group nitride, as for this condition, it is desirable to make it especially satisfied.

[0033] Furthermore, the coating film is formed so that the front face of a sealing metallic foil may be covered partially, and the condition that a part of sealing metallic foil [at least] is not covered by the coating film is maintained. This is because it becomes difficult to maintain the airtightness of the discharge container by the sealing metallic foil, when the front face of a sealing metallic foil is extensively covered with the coating film.

[0034] When distance which is not covered by L1 and the coating film of this distance L1 in distance with the joint edge of a joint edge with the sealing metallic foil of an electrode and the sealing metallic foil of an external lead is set to L2, as for the field which is not covered by the coating film of a sealing metallic foil, it is desirable to set up so that distance L2 may be first set to 3mm or more. If distance L2 is set to less than 3mm, it will become difficult to maintain the airtightness of a discharge container.

[0035] When it takes into consideration also about the field covered by the coating film, it is desirable to set up the covering field of the coating film so that the ratio of distance L1 and distance L2 may serve as the range of $0.005<L2/L1<0.8$. It becomes possible to fully acquire the effectiveness by the coating film,

after maintaining the airtightness of a discharge container by satisfying such conditions.
[0036] Especially the formation approach of coating film which was mentioned above is not limited, and can apply various coating methods. For example, the coating film can be formed in the field containing a joint with the electrode of a sealing metallic foil by applying the spreading calcinating method of a solution, plating, the thin film forming method, etc.
[0037] The coating film can be form by calcinate on the conditions which a sealing metallic foil (for example , Mo foil) be remarkable after make an organic solvent , water , etc. distribute at least a kind of ingredient powder first choose from a metal , a metallic oxide , and a metal nitride , prepare a slurry solution and make the need part of a sealing metallic foil apply and dry this , and do not oxidize or deteriorate , in apply the spreading calcinate method of a solution . Moreover, as a thin film forming method, vacuum deposition, the ion plating method, a spraying process, etc. are applicable.
[0038] Formation of the coating film may be carried out, after carrying out to the sealing metallic foil before joining an electrode and joining an electrode to a sealing metallic foil. When the coating film is formed after joining an electrode to a sealing metallic foil, it can form so that it may mention later, and the coating film may be covered, not only the front face of a sealing metallic foil but the field near the joint with the sealing metallic foil of an electrode, i.e., the base side front face of an electrode.
[0039] (discharge medium) A discharge medium is enclosed in a discharge container, is used, and contains a halogenation metal and rare gas. The halogenide of the metal which can use the halogenide of various metallic elements, for example, is contributed mainly to luminescence as a halogenation metal is used. As such 1st halogenide, the halogenide of a kind chosen from sodium (Na), a scandium (Sc), and a rare earth metal or two or more sorts of metallic elements can be used. Na and Sc are especially efficient photogene.
[0040] A halogenation metal can have relatively high vapor pressure, and a metaled kind or two or more sorts of halogenides which cannot emit light easily in a light region as compared with the metal of the 1st halogenide can be included as the 2nd halogenide. The metal which cannot emit light easily in a light region has an energy level higher than the metal of the 1st halogenide, and should just be in the condition that the metal of the 1st halogenide mainly emits light. Since the lamp voltage near the lamp which contains Hg by adding such 2nd halogenide can be obtained, it becomes possible to improve the electrical property and luminescence property of Hg loess metal halide lamp. The 2nd halogenide contributes also to a chromaticity improvement etc.
[0041] As the 2nd halogenide, for example Magnesium (Mg), iron (Fe), Cobalt (Co), chromium (Cr), zinc (Zn), nickel (nickel), Manganese (Mn), aluminum (aluminum), antimony (Sb), beryllium (Be), The halogenide of a kind or two or more sorts of metals chosen from a rhenium (Re), a gallium (Ga), an indium (In), titanium (Ti), a zirconium (Zr), and a hafnium (Hf) is used.
[0042] Furthermore, the halogenation metal may contain the 3rd halogenide. The 3rd halogenide is added as the component which contributes to control of an isolation halogen, a component which amends distribution of arc temperature and reduces heat loss. As the former, the halogenide of tin (Sn) is illustrated, for example. The halogenide of caesium (Cs) is mentioned as the latter.
[0043] Although iodine (I) is the most suitable for reactivity and reactivity becomes strong as a halogen which constitutes a halogenation metal at the order of a bromine (Br), chlorine (Cl), and a fluorine (F), as long as it requires, any of a more than may be used. Moreover, the compound of a different halogen can also be used together, for example like an iodide and a bromide.
[0044] About the amount of enclosure of a halogenation metal, the 1st halogenide which contributes, for example to luminescence mainly can be enclosed in 5-110mg per one cc (volume of discharge space) of content volume of a discharge container. The still more suitable range is 5-35mg per one cc of content volume of a discharge container. In such range, while being able to carry out the standup of the flux of light early, a light color can be stabilized. The 2nd halogenide can be enclosed in 0.05-200mg per one cc of content volume of a discharge container. About other halogenides, it is adjusted suitably.
[0045] Especially if rare gas does not act so that the main luminescence may be borne immediately after starting, while acting as the object for starting, and buffer gas, and a tight container generally is not penetrated, it is not limited, but since neon (Ne) tends to penetrate quartz glass, when forming a tight container with quartz glass, an argon (Ar), a krypton (Kr), or a xenon (Xe) is recommended. When depending for luminescence immediately after starting on rare gas, since luminous efficiency of a xenon is the highest, its xenon is the optimal.
[0046] Moreover, if charged pressure of rare gas is made high, the lamp voltage of a metal halide lamp can become high, a ramp input can be enlarged to the same lamp current, and the standup property of the

flux of light can be raised. although it is convenient that the standup property of the flux of light is good no matter it may be what the purpose of use -- especially -- the object for automobiles -- a headlight -- in equipment, a liquid crystal projector, etc., it is very important. As for rare gas, it is desirable for it to be enclosed by the pressure of three or more atmospheric pressures, and to enclose in the range of five to 15 atmospheric pressure especially.

[0047] As for the metal halide lamp of this invention, mercury is not enclosed in essence. Here, it is not restricted to the condition of "mercury not being enclosed in essence" and having not enclosed mercury at all, and means permitting less than 2mg [per one cc of content volume of a discharge container] mercury, and that mercury 1mg or less exists preferably. However, it is desirable on an environment not to enclose mercury at all. Like before, when maintaining the electrical property of a discharge lamp with mercury vapour, if it carries out in a short arc form from having enclosed further 20-40mg per one cc of content volume of a discharge container of mercury 50mg or more depending on the case, the amount of mercury can essentially say that this invention is few.

[0048] About an operation of the metal halide lamp of this invention Even if it originates in the electrode having not stuck completely to the closure section of a discharge container and a discharge medium invades into closure circles so that clearly also from the above explanation By the coating film which is chosen from a metal, a metallic oxide, and a metal nitride and which consists of a kind at least Since the field containing a joint with the electrode of a sealing metallic foil is covered, the reaction of the sealing metallic foil which consists of an Mo foil etc., and the isolation halogen in a discharge medium and metal halide can be controlled.

[0049] As mentioned above, in Hg loess metal halide lamp, it is easy to generate an isolation halogen with high reactivity with a metal like isolation iodine, this reacts notably with sealing metallic foils, such as Mo foil, especially, and it is easy to produce the crack of the foil piece of a sealing metallic foil, and the closure section, a burst, etc. According to the metal halide lamp of this invention, since a problem peculiar to such an Hg loess metal halide lamp is improvable with the coating film, it becomes possible to control the fall of the life property resulting from generating of un-switching on the light according to the foil piece of a sealing metallic foil, or crack leak, and further a burst etc. That is, the reinforcement of Hg loess metal halide lamp is realizable.

[0050] In the metal halide lamp according to claim 1 which mentioned above invention according to claim 2, it is characterized by the coating film consisting of an ingredient with reactivity lower than a sealing metallic foil with a halogen and a halogenation metal. A metal halide lamp according to claim 2 specifies a more desirable configuration, when controlling the reaction of the sealing metallic foil which consists of an Mo foil etc., and the isolation halogen in a discharge medium and metal halide.

[0051] Here, when the ingredient with reactivity lower than a sealing metallic foil with a halogen and a halogenation metal is made to react with a halogen and a halogenation metal for example, under the same conditions, it is desirable for an ingredient with a corrosion rate, a generation-of-gas rate, etc. lower than a sealing metallic foil (for example, Mo foil) accompanying a reaction to be shown, and to use an inactive ingredient chemically especially to a halogen and a halogenation metal.

[0052] As a metallic material with which are satisfied of such conditions, as being chosen out of platinum (Pt), a tantalum (Ta), a tungsten (W), a rhenium (Re), niobium (Nb), vanadium (V), a zirconium (Zr), a hafnium (Hf), a holmium (Ho), a dysprosium (Dy), an yttrium (Y), a scandium (Sc), and boron (B), for example, a kind be mentioned as it is few A metallic material may be used as an alloy not only containing when using as a simple substance metal, but the above-mentioned metallic element.

[0053] Moreover, as a metallic oxide, as being chosen out of a silica (SiO2), an alumina (aluminum 2O3), a zirconia (ZrO2), hafnia (HfO2), yttria (Y2O3), an oxidization holmium (Ho 2O3), an oxidization dysprosium (Dy 2O3), scandium oxide (Sc 2O3), and tantalum oxide (Ta 2O5), a kind is mentioned as it is few. The nitride of the metallic element same as a metal nitride is mentioned, and the nitride of Si, aluminum, and Ti etc. is illustrated further. These compounds may be used as two or more sorts of mixture, and may also be conjugated compounds like an acid nitride.

[0054] Since a reaction with a halogen or a halogenation metal can be controlled much more effectively by applying the coating film which consists of an ingredient which was mentioned above, it becomes possible to control sharply the crack initiation of the closure section resulting from this reaction, generating of further a burst, etc. Therefore, the life of Hg loess metal halide lamp can be prolonged more certainly.

[0055] In the metal halide lamp according to claim 1 or 2 which mentioned above invention according to claim 3, the thickness of the coating film is 50nm or more, and is characterized by being 80% or less of

the maximum thickness of a sealing metallic foil. A metal halide lamp according to claim 3 specifies the suitable thickness of the coating film.
[0056] That is, the effectiveness which covers the field which contains a joint with the electrode of a sealing metallic foil as the thickness of the coating film is less than 50nm is not fully acquired, but there is a possibility that the reaction of a sealing metallic foil, and a halogen or a halogenation metal cannot be controlled certainly. On the other hand, when the thickness of the coating film exceeds 80% of the maximum thickness of a sealing metallic foil (for example, Mo foil), a possibility that the reaction of a sealing metallic foil, and a halogen or a halogenation metal cannot be controlled certainly similarly is in the coating film itself from becoming easy to produce exfoliation etc. The thickness of the coating film is 100nm or more, and it is more desirable that it is 40% or less of range of the maximum thickness of a sealing metallic foil.
[0057] Moreover, in case the coating film is formed so that the whole surface of sealing metallic foils, such as Mo foil, may be covered, when the edge of a sealing metallic foil serves as an edge configuration, it is desirable to form the coating film so that the thickness of such the edge section may be set to 10 micrometers or more. Especially in case a metallic-oxide metallurgy group nitride is used for the coating film, it is desirable to satisfy this condition. That is, when forming the coating film with a metallic-oxide metallurgy group nitride, it is difficult to cover the edge section uniformly, and easy to produce the reaction by the halogen or the halogenation metal from such a part. By setting thickness of the edge section to 10 micrometers or more, generating of such a problem is effectively avoidable.
[0058] In the metal halide lamp claim 1 which mentioned above invention according to claim 4 thru/or given in 3 any 1 terms, the formation field of the coating film is characterized by setting the distance from the joint edge of a sealing metallic foil and an electrode as 0.05mm or more 4mm or less. A metal halide lamp according to claim 4 specifies the suitable formation field of the coating film.
[0059] That is, there is a possibility that the formation range of the coating film cannot fully control the reaction of a sealing metallic foil, and a halogen or a halogenation metal as it is less than 0.05mm from a joint edge. It is desirable to form the coating film so that the whole surface including the end face and the edge section by the side of discharge space may be covered about the discharge space side edge section of a sealing metallic foil, as mentioned above, but if the formation range of the coating film becomes not much large too much, in order that the area on the front face of exposure of a sealing metallic foil may decrease relatively, as for the formation range of the coating film, it is desirable to be referred to as less than 4mm and less than 2 moremm from a joint. It is as having mentioned above about the exposure front face of a sealing metallic foil itself.
[0060] In the metal halide lamp according to claim 1 which mentioned above invention according to claim 5, it is characterized by forming the coating film so that the field containing the part by the side of a joint with the sealing metallic foil of an electrode may be covered. An operation as specifies forming a metal halide lamp according to claim 5 so that the coating film may be covered to some electrodes and shows it below by this is acquired.
[0061] Namely, as mentioned above, it sets to Hg loess metal halide lamp. While the condition that the isolation halogen etc. solidified to the electrode point, were easy to adhere to it after putting out lights, and this isolation halogen adhered is large and specific resistance cannot energize it easily After lamp lighting, since the concentration of an isolation halogen etc. becomes high only in the perimeter of an electrode point, discharge in the perimeter of an electrode point is checked, and there is a problem of being easy to produce the abnormality discharge on the basis of an electrode shaft etc. and the so-called back arc. By forming to such a point, so that the coating film may be covered to some electrode shafts, the part can be made hard to energize and it enables this to control generating of a back arc.
[0062] The depressor effect of a back arc is [as opposed to / especially / the metal halide lamp which enclosed rare gas in the range of five to 15 atmospheric pressure] effective. Although in other words it is easy to generate a back arc especially in Hg loess metal halide lamp which enclosed rare gas in the range of five to 15 atmospheric pressure, generating of the back arc in such an Hg loess metal halide lamp can be effectively controlled by forming so that the coating film may be covered to some electrode shafts, as mentioned above.
[0063] Although you may form so that only the electrode surface where the wrap coating film is located in closure circles in some electrodes may be covered, it is desirable to form so that it may cover to some electrodes exposed in discharge space, when acquiring more effectively the depressor effect of the back arc mentioned above. However, since there is a possibility that the coating film may serve as an elevated temperature at the time of discharge, and evaporation of the coating film etc. may arise when the

formation range of the coating film becomes close to an electrode point too much, it is desirable to satisfy conditions as shown below.

[0064] That is, when distance to root Motobe currently embedded in the closure section from the discharge space side point of an electrode is set to L3, as for the formation range of the coating film, it is desirable to consider as the range from root Motobe to 30% of the distance L3. In other words, since it is easy to become an elevated temperature at the time of discharge, as for the range from 30% of location of distance L3 to [from root Motobe of an electrode] the discharge space side point of an electrode, it is desirable not to form the coating film.

[0065] In the metal halide lamp according to claim 5 which mentioned above invention according to claim 6, it is characterized by the coating film consisting of an ingredient with larger specific resistance than an electrode. Thus, it becomes possible by forming the coating film with an ingredient with larger specific resistance than an electrode to control a back arc more certainly. Especially as an ingredient with large specific resistance, it is more desirable than an electrode to use a metallic oxide.

[0066] In the metal halide lamp according to claim 5 which mentioned above invention according to claim 7 the coating film While covering the part by the side of the joint of the 1st part which reactivity with a halogen and a halogenation metal becomes from an ingredient lower than a sealing metallic foil while covering the field containing a joint with the electrode of a sealing metallic foil, and the sealing metallic foil of an electrode It is characterized by having the 2nd part which consists of an ingredient with larger specific resistance than an electrode. According to such a metal halide lamp, the reaction depressor effect of a sealing metallic foil and the depressor effect of a back arc can be acquired more certainly.

[0067] In the metal halide lamp according to claim 1 which mentioned above invention according to claim 8, it is characterized by forming the coating film so that the field containing the part by the side of a joint with the sealing metallic foil of an electrode may be covered, and preparing the clearance between the coating film and the closure section. While forming a metal halide lamp according to claim 8 so that the coating film may be covered to some electrodes, an operation as specifies having prepared the clearance between the closure sections based on the coating film and shows it below by this is acquired.

[0068] Since sealing of the sealing metallic foil to which the electrode shaft was joined is carried out with quartz glass etc. in the closure section of a metal halide lamp as mentioned above, based on the configuration etc., it is easy to generate bigger distorted stress than other parts. especially -- a metal halide lamp -- the object for automobiles -- a headlight -- when it uses for equipment, there are many counts of flashing of a lamp -- in addition, since the injection power immediately after starting is large, it is easy to generate a crack and a burst in the closure section by the thermal shock accompanying a lamp flash etc.

[0069] By forming to such a point, so that the coating film may be covered to some electrode shafts, the wettability to the quartz glass of that part etc. can be reduced, and a clearance can be prepared between the coating film and the closure section based on the wettability difference to this quartz glass etc. Since the thermal stress which joins the closure section with flashing of the distorted stress and the lamp which are generated by preparing such a clearance at the time of electrode sealing is eased sharply, it becomes possible to control effectively the crack of the closure section based on the increment in the count of flashing of a lamp etc., and a burst. This can raise further the life property of Hg loess metal halide lamp.

[0070] The clearance between the coating film and the closure section is explained in more detail. That is, when obtaining the relaxation effect of stress with the coating film, as for the wrap coating film, it is desirable that the wettability to quartz glass etc. forms some electrode shafts with a sealing metallic foil (for example, Mo foil) or an ingredient lower than an electrode (for example, W electrode). As a formation ingredient of such coating film, metallic materials, such as Cr and Pt, are mentioned, for example. Other metallic material metallurgy group oxides have the wettability lower than Mo foil to quartz glass etc. in many cases.

[0071] When sealing the sealing metallic foil to which the electrode shaft was joined with quartz glass etc., a sealing metallic foil and an electrode shaft are stuck to quartz glass at the elevated temperature more than the melting point of quartz glass. In the part in which coating film which was described above is formed, the coating film contacts quartz glass. Then, since a metal member contracts by the ratio with more figure single [about] than quartz glass by the cooling process, quartz glass is pulled by the metal member. Since the closure section and sealing conditions are set up so that the hermetic seal of the

sealing metallic foils, such as Mo foil, may be carried out from the first, about the part which Mo foil exposed, quartz glass has stuck them after cooling.
[0072] On the other hand, in the part in which the coating film with low wettability exists compared with a sealing metallic foil or an electrode, quartz glass cannot fully be pulled by the cooling process, but a clearance is formed between the coating film and the closure section after cooling. In addition, although a minute clearance is formed also between an electrode shaft and the closure section, since the clearance based on the coating film can give the gap beyond it, it becomes possible [easing more certainly the distorted stress at the time of sealing, the thermal stress accompanying flashing of a lamp etc.]. Therefore, reinforcement of Hg loess metal halide lamp can be realized more certainly.
[0073] When acquiring more certainly the stress relaxation effectiveness in which the wrap coating film mentioned some electrodes above, it is desirable to form in the range of 0.1mm or more from the joint edge of an electrode and a sealing metallic foil. When the die length of a joint with the sealing metallic foil of L4 and an electrode shaft is set to L5 for the overall length of the part currently embedded in the closure section of an electrode shaft, the range of the optimal formation range of the coating film is (L5+ (L4-L5) x0.5) from the joint side edge section of an electrode shaft. According to such coating film, the clearance which is excellent in the stress relaxation effectiveness between the closure sections can be formed more in fitness.
[0074] Here, the stress relaxation effectiveness based on the clearance between the coating film and the closure sections which were mentioned above is peculiar to Hg loess metal halide lamp. That is, in the metal halide lamp containing Hg, even if it forms the coating film in an electrode shaft and prepares a clearance between the closure sections, in order that Hg may trespass upon a clearance, the stress at the time of a temperature change increases conversely, and can control neither the crack of the closure section, nor generating of a burst. In Hg loess metal halide lamp, even if a metaphor isolation halogen and a halogenide trespass upon a clearance, in order to solidify immediately by the discharge space side, the clearance which shows the stress relaxation effectiveness acts effectively.
[0075] Invention according to claim 9 is characterized by operating with the lamp power not more than 100W at the time of stability in the metal halide lamp of claim 1 thru/or 8 any 1 term publication mentioned above. the lamp power supplied to a lamp -- the small metal halide lamp not more than 100W -- the object for automobiles -- a headlight -- it is suitable as the light source of equipment.
[0076] Invention according to claim 10 is characterized by the maximum current at the time of starting being more than 3A in the metal halide lamp of claim 1 thru/or 9 any 1 term publication mentioned above. such a metal halide lamp -- the object for automobiles -- a headlight -- it is suitable as the light source of equipment.
[0077] Claim 1 which the metal halide lamp lighting device of invention according to claim 11 mentioned above thru/or a metal halide lamp given in 10 any 1 terms; it is characterized by providing the lighting circuit which turns on said metal halide lamp by direct current, and;. It specifies that a metal halide lamp lighting device according to claim 11 carries out direct-current lighting of the metal halide lamp of this invention.
[0078] That is, compared with the case where alternating current lighting of the metal halide lamp containing Hg is carried out, equipment can be miniaturized by carrying out direct-current lighting of the metal halide lamp of this invention. By automobile, since the direct current is used, it is because it is not necessary to convert the power to an alternating current. Furthermore, the isolation iodine which is produced in direct-current lighting is electrified, and this is electrically lengthened by Mo foil by the side of an anode plate, and it reacts rapidly with an anode plate side Mo foil. For this reason, problems, such as a crack of Mo foil, become serious from the case of alternating current lighting. According to this invention, the trouble of such direct-current lighting is cancelable, and when it is direct-current lighting, a big life improvement effect is acquired. thus, the metal halide lamp lighting device of this invention -- especially -- the headlight of an automobile -- it is suitable for equipment.
[0079] the object for the automobiles of invention according to claim 12 -- a headlight -- a metal halide lamp claim 1 which mentioned equipment above thru/or given in 10 any 1 terms, and; -- the object for automobiles which has the optical axis which said metal halide lamp was arranged and met the longitudinal direction of said discharge container of said metal halide lamp -- a headlight -- it is characterized by providing the body of equipment, and;.
[0080] the object for the automobiles of this invention -- a headlight -- since equipment is equipped with the metal halide lamp of this invention which is excellent in a life property etc. as the light source, it can maintain the function as a headlight safely over a long period of time. in addition, the object for

automobiles -- a headlight -- the body of equipment -- the object for automobiles -- a headlight -- all the configurations of the remainder excluding the metal halide lamp from equipment are included.
[0081]
[Embodiment of the Invention] Hereafter, the gestalt for carrying out this invention is explained.
[0082] (1st operation gestalt) Drawing 1 is the sectional view showing the outline configuration of the 1st operation gestalt of the metal halide lamp of this invention. Drawing 2 is the top view showing the configuration of the sealing metallic foil part (sealing metallic foil to which the electrode and the external lead were joined) used with the metal halide lamp shown in drawing 1 . Drawing 3 is the sectional view expanding and showing the condition of having sealed the sealing metallic foil part shown in drawing 2 R> 2 by the closure section of a discharge container.
[0083] For a discharge container and 3, as for Mo foil as a sealing metallic foil, and 5, in each [these] drawing, an electrode and 4 are [1 / a metal halide lamp and 2 / an external lead and 6] coating film.
[0084] The metal halide lamp 1 has the discharge container 2 which consists of a hollow spindle-formed tight container made from quartz glass. Long and slender discharge space 2a is formed in the interior of this discharge container 2, and closure section 2b of a pair is further prepared in the both ends of the discharge container 2 at one, respectively.
[0085] In discharge space 2a, the electrode 3 of a pair counters, it is arranged, and these electrodes 3 have electrode point 3b made into path size, more nearly respectively than electrode shaft 3a and it. The electrode 3 of a pair is supported by the position in discharge space 2a by laying the base side edge section of electrode shaft 3a underground in closure section 2b, respectively. Electrode point 3b of path size is formed in electrode shaft 3a and one.
[0086] Electrode point 3b is made spherical. According to such electrode point 3b, a good electrical property and a luminescence property can be acquired. Moreover, about the configuration of electrode point 3b, while making the whole outline configuration spherical, it is also effective to make a part for the point which faces into a flat surface (for example, round shape with a diameter of 0.2-0.5mm). According to such electrode point 3b, the instability and CHIRATSUKI of an arc spot with a possibility that it may be generated with a spherical electrode can be prevented.
[0087] Here, the discharge container 2 is constituted by the tight container with the comparatively thick thickness of the part which surrounds discharge space 2a. When the maximum bore of discharge space 2a located in X (mm) and 80% of its central approach in the distance between the electrodes 3 of a pair is specifically set to D (mm) and the maximum thickness is set to t (mm), D/X is set up so that 0.25-1.50, and t/X may serve as the range of 0.16-1.10. Since a temperature rise can be brought forward according to such a discharge container 2, the effectiveness that the standup of the flux of light becomes early, like that change of a light color decreases and lamp voltage becomes low is acquired. However, the configuration of the discharge container 2 in the metal halide lamp 1 of this invention is not restricted to the above-mentioned thing.
[0088] Moreover, as for the configuration of closure section 2b, thickness of the quartz glass of the thickness direction of 2.5-6mm (the optimal 4mm) and the Mo foil 4 is set to 1.5-3.5mm (the optimal 2mm) for the width of face of the quartz glass of the cross direction of the Mo foil 4.
[0089] Electrode shaft 3a of the electrode 3 of a pair is joined to one edge side of the Mo foil 4. Weldbonding of one edge of the external lead 5 is carried out to the other-end section side of the Mo foil 4, respectively, and the other-end section of these external lead 5 is drawn out of the discharge container 2. The Mo foil 4 is in the condition that electrode shaft 3a and the external lead 5 were joined, and sealing is airtightly carried out by the closure section 2.
[0090] The airtight condition in the discharge container 2 is maintained by sealing the Mo foil 4 with the quartz glass of the closure section 2. The Mo foil 4 has the thickness of the range of 10-30 micrometers, and has the die length of the range of 5-15mm. The edge section is prepared in the both ends of the longitudinal direction of the Mo foil 4 so that airtight sealing nature may be raised.
[0091] As shown in drawing 2 , it is covered with the coating film 6 which is chosen from a metal, a metallic oxide, and a metal nitride and which consists of a kind at least near the joint of the Mo foil 4 and electrode shaft 3a. The coating film 6 is partially formed so that the field containing a joint with electrode shaft 3a of the Mo foil 4 may be covered, and as for some Mo foils 4, the exposure, i.e., an adhesion condition with the quartz glass of the closure section 2, is maintained. The thickness of the coating film 6 is 50nm or more, and is 80% or less of the maximum thickness of the Mo foil 4.
[0092] Let the formation field of the coating film 6 be the range of 0.05mm or more 0.4mm or less from the joint edge of the Mo foil 4 and electrode shaft 3a. Moreover, the formation field of the coating film 6

is set up so that the distance L2 corresponding to the part which is not covered by the coating film 6 among the distance L1 with the joint edge of a joint edge with the Mo foil 4 of electrode shaft 3a and the Mo foil 4 of the external lead 5 may be set to 3mm or more. Furthermore, the ratio of distance L1 and distance L2 is set up so that it may become the range of $0.005<L2/L1<0.8$.

[0093] The coating film 6 mentioned above controls the reaction of the Mo foil 4, and the isolation halogen in a discharge medium and metal halide. When controlling the reaction of the Mo foil 4, and an isolation halogen and metal halide, the coating film 6 is formed so that the whole surface including both sides of the Mo foil 4 and the end face by the side of discharge space 2a, or an edge edge may be covered.

[0094] Since the coating film 6 is formed after it joins electrode shaft 3a to the Mo foil 4, while a part for a joint with the Mo foil 4 of electrode shaft 3a is covered with the coating film 6, a part of part with which the Mo foil 4 of electrode shaft 3a has not lapped is covered by the coating film 6. The covering field by the coating film 6 of electrode shaft 3a As opposed to the overall length L4 of the part which is set to 0.1mm or more from the joint edge with the Mo foil 4 of electrode shaft 3a, and is embedded further at closure section 2b of electrode shaft 3a, and the die length L5 of a joint with the Mo foil 4 of electrode shaft 3a It is formed so that distance L6 from the joint side edge section of electrode shaft 3a may become the following (L5+(L4-L5) x0.5).

[0095] By applying the coating film 6 which was mentioned above, the clearance 7 as shown in drawing 3 is formed between the coating film 6 and closure section 2b. In addition, although a minute clearance is formed also between electrode shaft 3a of a part and closure section 2bs which are not covered by the coating film 6, between the coating film 6 and closure section 2b, the clearance 7 which has the width of face beyond it is formed. Such a clearance 7 is excellent in the stress relaxation effectiveness.

[0096] In the discharge container 2, a halogenation metal and rare gas are enclosed as a discharge medium. A discharge medium does not contain Hg in essence. The halogenation metal may contain the 3rd halogenide which contributes to control of a kind of the metal which vapor pressure is relatively higher still, and cannot emit light easily in a light region as compared with the metal of the 1st halogenide including a kind or two or more sorts of 1st halogenides chosen from Na, Sc, and the rare earth metal which are contributed mainly to luminescence or two or more sorts of 2nd halogenides, and an isolation halogen, reduction of heat loss, etc. at least.

[0097] Next, the example and its evaluation result of Hg loess metal halide lamp 1 by the 1st operation gestalt are described.

[0098] As an example 1 - 4 discharge containers 2, the tight container made from quartz glass which has a configuration with an outer diameter [of 6.5mm] and a bore of 3mm was used. The electrode 3 of a pair set inter-electrode distance to 4.2mm using W electrode whose outer diameter of electrode shaft 3a is 4mm. While making these ratios into ScI3:NaI:ZnI 2= 1:5:3 by the volume ratio about the halogenation metal among discharge media using ScI3, NaI, and ZnI2, 1mg was enclosed in the amount of whole. Xe was enclosed with eight atmospheric pressures, using Xe as rare gas.

[0099] Furthermore, after preparing the Mo foil 4 with 25 micrometers [in thickness], and a die length of 10mm and carrying out weldbonding of the electrode shaft 3b of an electrode 3 to this, the following coating film 6 was formed, respectively. In the example 1, 2OSc3 film of 5 micrometers of thickness was formed by the water-solution spreading calcinating method. In the example 2, 2ODy3 film of 10 micrometers of thickness was formed by the alkoxide liquid spreading calcinating method, Pt film of 10 micrometers of thickness was formed with plating in the example 3, and Hf film of 8 micrometers of thickness was formed with vacuum deposition in the example 4.

[0100] Each component of the above-mentioned coating film 6 has reactivity lower than Mo foil with a halogen and a halogenation metal, and its wettability to quartz glass is still lower than Mo foil and W electrode. Moreover, each coating film 6 was formed so that a part of field containing a joint with electrode shaft 3a of the Mo foil 4 and electrode shaft 3a might be covered. The formation field of each coating film 6 was made into the range of less than 1.5mm from the joint edge of the Mo foil 4 and electrode shaft 3a, and distance L2 was set to 5.5mm. The covering part of electrode shaft 3a was set to 5mm from the joint edge with the Mo foil 4.

[0101] Each Hg loess metal halide lamp 1 by the examples 1-4 mentioned above was turned on by lamp power 40W, and the lifetime in that case was measured. In addition, as an example 1 of a comparison with this invention, except not forming the coating film 6, Hg loess metal halide lamp which has the same configuration was produced, and the lifetime was similarly measured by lamp power 40W about this. These results are shown in drawing 4 .

[0102] It turns out that the lifetime is prolonged compared with Hg loess metal halide lamp of the example 1 of a comparison, and the coating film 6 is committing effectively each Hg loess metal halide lamp 1 by examples 1-4 so that clearly from drawing 4 . In addition, the clearance 7 between the coating film 6 and closure section 2b is maintained after lighting actuation, and, as for each Hg loess metal halide lamp 1 by examples 1-4, it was checked that this clearance 7 functions as the stress relaxation section.
[0103] It replaces with each coating film mentioned above. In addition, SiO2 film, ZrO2 film, HfO2 film, 2OY3 film, 2OHo3 film, 2OTa3 film, 2Oaluminum3 film, It checked having the good life property similarly also about Hg loess metal halide lamp using Si3N4 film, the AlN film, the TiN film, Ta film, W film, Re film, Nb film, V film, Zr film, Ho film, Dy film, Y film, and Sc film, respectively.
[0104] (2nd operation gestalt) Drawing 5 is the top view showing the important section (sealing metallic foil part to which the electrode and the external lead were joined) of the 2nd operation gestalt of the metal halide lamp of this invention. The same sign is attached about the same part as drawing 1 and drawing 2 . In addition, since the whole metal halide lamp configuration is the same as that of drawing 1 , the explanation is omitted.
[0105] In this 2nd operation gestalt, like the 1st operation gestalt, the coating film 6 is formed so that the Mo foil 4 of a part for a joint with the field and the Mo foil 4 of electrode shaft 3a containing a joint with electrode shaft 3a of the Mo foil 4 and electrode shaft 3a may cover a part of part which has not lapped. The covering field by the coating film 6 of electrode shaft 3a has reached not only to the part embedded in closure section 2b but to a part of part exposed to discharge space 2a.
[0106] Under the present circumstances, let the formation range of the coating film 6 be the range from root Motobe of electrode shaft 3a to 30% of the distance L3 to the distance L3 to root Motobe currently embedded at closure section 2b of electrode point 3b to electrode shaft 3a. In other words, between 30% of location of distance L3, and electrode point 3b, the coating film 6 is not formed from root Motobe of electrode shaft 3a.
[0107] As mentioned above, since [alias a wrap] electrode shaft 3a can be made hard to energize "Be alike", it becomes possible to control generating of a back arc to a part of electrode shaft 3a exposed to discharge space 2a by the coating film 6. Under the present circumstances, generating of a back arc can be more certainly controlled by forming the coating film with metallic oxides, such as an ingredient with larger specific resistance than an electrode 3 especially SiO2 and aluminum 2O3, Sc2O3, and Dy2O3. In addition, about the configuration except having mentioned above, it is supposed that it is the same as that of the 1st operation gestalt.
[0108] Moreover, as shown in drawing 6 , it is also effective to form the coating film 6 with two kinds of ingredients. The coating film 6 shown in drawing 6 has 2nd partial 6b which consists of an ingredient with larger specific resistance than an electrode 3 while covering a part of 1st partial 6a which reactivity with a halogen and a halogenation metal becomes from an ingredient lower than the Mo foil 4 while covering the field containing a joint with electrode shaft 3a of the Mo foil 4, and electrode shaft 3a. According to such a configuration, the reaction depressor effect of the Mo foil 4 and the depressor effect of a back arc can be certainly acquired by coincidence.
[0109] Next, the example and its evaluation result of Hg loess metal halide lamp by the 2nd operation gestalt are described.
[0110] After preparing the Mo foil 4 with 25 micrometers [in an example 5 - 7 thickness], and a die length of 10mm and carrying out weldbonding of the electrode shaft 3a of an electrode 3 to this, the following coating film 6 was formed, respectively. In the example 5, 2Oaluminum3 film of 10 micrometers of thickness was formed by the alkoxide liquid spreading calcinating method. In the example 6, Ta film of 8 micrometers of thickness was formed by the ion plating method. Moreover, about the example 7, the field containing a joint with electrode shaft 3a of the Mo foil 4 was covered with Cr film of 10 micrometers of thickness, and the electrode shaft 3a side was covered with 2Oaluminum3 film of 10 micrometers of thickness.
[0111] The covering range of electrode shaft 3a by each coating film 6 was carried out to to 1mm in the direction of an electrode tip by the side of discharge space from root Motobe currently embedded at closure section 2b of electrode shaft 3a. As the same as that of an example 1, Hg loess metal halide lamp was produced, respectively except these conditions.
[0112] The wink test of Hg loess metal halide lamp of the example 2 of a comparison which has the same configuration was carried out by lamp power 40W each Hg loess metal halide lamp of the examples 5-7 mentioned above, and except not forming the coating film 6 further. Consequently,

according to each Hg loess metal halide lamp of examples 5-7, compared with the example 2 of a comparison, it was checked that there is little generating of a back arc sharply. Furthermore, the good result was shown like [property / life] examples 1-4.
[0113] (3rd operation gestalt) Drawing 7 is the front view showing the outline configuration of the 3rd operation gestalt of the metal halide lamp of this invention. the metal halide lamp 1 which has the configuration as drawing 1 with this 3rd same operation gestalt -- further -- the object for automobiles -- a headlight -- the structure suitable for equipping equipment is shown. As for an outer tube and 12, in this drawing, 11 is [a mouthpiece and 13] insulating tubes.
[0114] The outer tube 11 is equipped with the ultraviolet-rays cut engine performance, and the metal halide lamp 1 which has the same configuration as drawing 1 in the interior is contained. Although the both ends of an outer tube 11 are being fixed to closure section 2b of a metal halide lamp 1, respectively, the interior is not airtight and is open for free passage in the open air. One closure section 2b of a metal halide lamp 1 stands erect in the mouthpiece 12. The external lead 5 drawn from the other end is arranged in parallel with an outer tube 11, and the tip is connected to the terminal which it is introduced in a mouthpiece 12 and illustrated. The perimeter of this external lead 5 is covered with the insulating tube 13.
[0115] The optical direction of radiation by the metal halide lamp 1 becomes in the direction of an insulating tube 13 and the opposite side. Under the present circumstances, it is also effective to constitute an insulating tube 13 from a ceramic tube, and to color this ceramic tube black etc. According to the black ceramic tube, since it is hard to reflect the light from a metal halide lamp 1, the glare by the scattered reflection of light can be controlled. control of a glare -- the object for automobiles -- a headlight -- it is [as opposed to / especially / equipment] effective. Black-ization of a ceramic tube can be carried out by spreading of a metallic oxide, baking, etc.
[0116] (4th operation gestalt) drawing 8 -- the object for the automobiles of this invention -- a headlight -- the perspective view showing the outline configuration of 1 operation gestalt of equipment -- a candy. In this drawing, 14 is a reflecting mirror and 15 is a front cover.
[0117] A reflecting mirror 14 is formed in variant paraboloid of revolution by shaping of plastics, and it is constituted so that the metal halide lamp (not shown) shown in drawing 7 from a top tooth back may be detached and attached. Prism or a lens is formed in one by shaping of the plastics of transparency, and front opening of a reflecting mirror 14 is airtightly equipped with the front cover 15.
[0118] (5th operation gestalt) Drawing 9 is the circuit diagram showing the 1st operation gestalt of the metal halide lamp lighting device of this invention. This operation gestalt is constituted so that direct-current lighting of the metal halide lamp may be carried out. this drawing -- setting -- 21 -- for a control means and 24, as for a lamp voltage detection means and 26, a lamp current detection means and 25 are [DC power supply and 22 / a chopper and 23 / a starting means and 27] metal halide lamps.
[0119] A dc-battery or rectification-ized DC power supply is used for DC power supply 21. In the case of an automobile, generally, a dc-battery is used. However, you may be the rectification-ized DC power supply which rectify an alternating current. Moreover, it graduates by carrying out parallel connection of the electrolytic capacitor 21a if needed.
[0120] A chopper 22 controls a metal halide lamp 27 to necessary while changing direct current voltage into the electrical potential difference of a necessary value. When a DC-power-supply electrical potential difference is low, in being high on the contrary, it uses a pressure-lowering chopper using a pressure-up chopper.
[0121] A control means 23 controls a chopper 22. For example, immediately after lighting, the lamp current is gradually extracted for the lamp current of 3 times or more of a rated lamp current from the chopper 22 with the passage of time a sink and after that at the metal halide lamp 27, and it controls to make it a rated lamp current soon. Moreover, by carrying out the feedback input of the detecting signal of a lamp current and lamp voltage, a control means 23 generates a constant power control signal, and carries out constant power control of the chopper 22. Furthermore, the microcomputer with which the time control pattern was beforehand built into the control means 23 is built in, and it is constituted so that this may control a lamp current.
[0122] The lamp current detection means 24 is inserted in a lamp and a serial, detects a lamp current, and it carries out a control input to a control means 23. It connects with a lamp in juxtaposition, and the lamp voltage detection means 25 detects lamp voltage, and it carries out a control input to a control means 23. The starting means 26 is constituted so that the pulse voltage of 20kV can be supplied to a metal halide lamp 27 at the time of starting.

[0123] And if direct-current lighting of the metal halide lamp is carried out using the metal halide lamp lighting device of this operation gestalt, the necessary flux of light will be generated from immediately after lighting. thereby -- the object for automobiles -- lighting of 80% of flux of lights is realizable after 25% of flux of lights, and 4 seconds to rating after [of an after / powering on] 1 second required as a headlight. Moreover, since a direct-current-alternating current conversion circuit becomes unnecessary, as compared with alternating current lighting, about 30% of cost reduction is possible. Moreover, it is mitigable 15% by weight. In connection with this, a lighting circuit becomes cheap.
[0124] (6th operation gestalt) Drawing 10 is the circuit diagram showing the 2nd operation gestalt of the metal halide lamp lighting device of this invention. The same sign is given to the same part as drawing 9 , and explanation is omitted. These operation gestalten differ at the point constituted so that alternating current lighting of the metal halide lamp might be carried out.
[0125] 28 is a conversion-into-ac means. This conversion-into-ac means 28 consists of a full bridge inverter. That is, parallel connection of the pair of the series circuit of the switching means 28a and 28a of a pair is carried out between the outgoing ends of a chopper 22, a bridge circuit is constituted, the oscillation output of oscillator 28b is supplied to the switching means of the four directions of a vertical angle of switching means 28a by turns, and high-frequency ac is generated between the outgoing ends of a bridge circuit.
[0126] And the metal halide discharge lamp 27 is turned on by high-frequency ac. Also in the configuration of this alternating current lighting format, the same control as drawing 9 is performed.
[0127]
[Effect of the Invention] According to each invention of claim 1 thru/or 4, since the reaction with a sealing metallic foil, the isolation halogen in a discharge medium, a halogenation metal, etc. is controlled with the coating film, generating of a burst etc. can be suppressed further and it enables this leak by the crack of a foil piece and the closure section and it accompanying the reaction of a sealing metallic foil, and to offer long lasting Hg loess metal halide lamp.
[0128] Since generating of abnormality discharge, such as a back arc, is controlled with the coating film, while being able to suppress the reaction of a sealing metallic foil further according to each invention of claim 5 thru/or 7, generating of CHIRATSUKI or abnormality luminescence can be suppressed and it enables this to offer long lasting Hg loess metal halide lamp with high performance.
[0129] Since according to invention of claim 8 the clearance was prepared between the closure sections with the coating film and this has mitigated the distorted stress at the time of lamp production, and the thermal stress accompanying flashing actuation, generating of a burst etc. can be suppressed further and it enables this leak by the crack of the closure section, or it, and to offer long lasting Hg loess metal halide lamp.
[0130] According to invention of claim 11, it becomes possible to offer the lighting device miniaturized rather than the case where alternating current lighting of the Hg enclosure metal halide lamp is carried out by providing the lighting circuit which turns on a metal halide lamp by direct current.
[0131] according to invention of claim 12 -- the object for automobiles -- a headlight -- since the body of equipment is equipped with the metal halide lamp of this invention -- long lasting -- the reliable object for automobiles -- a headlight -- it becomes possible to offer equipment.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing the configuration of the metal halide lamp by the 1st operation gestalt of this invention.
[Drawing 2] It is the top view showing the sealing metallic foil part of the metal halide lamp shown in drawing 1 .
[Drawing 3] It is the sectional view expanding and showing the condition of having sealed the sealing metallic foil part shown in drawing 2 by the closure section of a discharge container.
[Drawing 4] It is drawing showing the life property of the metal halide lamp by the examples 1-4 of this invention as compared with the conventional metal halide lamp.
[Drawing 5] It is the top view showing the sealing metallic foil part of the metal halide lamp by the 2nd operation gestalt of this invention.
[Drawing 6] It is the top view showing the modification of the sealing metallic foil part shown in drawing 5 .
[Drawing 7] the metal halide lamp of this invention -- the object for automobiles -- a headlight -- it is the front view showing the example of 1 configuration at the time of applying to equipment.
[Drawing 8] the object for the automobiles of this invention -- a headlight -- it is the perspective view showing the example of 1 configuration of equipment.
[Drawing 9] It is the circuit diagram showing an example of the lighting device used in case the metal halide lamp of this invention is turned on.
[Drawing 10] It is the circuit diagram showing other examples of the lighting device used in case the metal halide lamp of this invention is turned on.
[Description of Notations]
1 [.. The closure section, 3 / .. An electrode, 4 / .. A sealing metallic foil, 5 / .. An external lead, 6 / .. The coating film, 7 / .. Clearance] .... A metal halide lamp, 2 .. A discharge container, 2a .. Discharge space, 2b

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[Translation done.]